## Claims

1. A magnetic recording medium comprising a substrate, an interlayer and a magnetic layer, the interlayer comprising at least a first intermediary layer, a second intermediary layer and a third intermediary layer, wherein the first intermediary layer or the third intermediary layer is non-magnetic and the second intermediary layer has a hexagonal close pack crystal structure and a property of providing RKKY coupling between the first intermediary layer and the third intermediary layer when the first intermediary layer and the third intermediary layer are magnetic layers.

2. The medium of claim 1, wherein the first intermediary layer has a hexagonal close pack crystal structure and comprises Co or a Co alloy with at least one element selected from the group consisting of Cr, Pt, Ta, B, Ti, Zr, Hf, Mo, Ru, Si, Ge, Nb, Fe, Ni, Ag, Au and combinations thereof.

3. The medium of claim 2, wherein the third intermediary layer has a hexagonal close pack crystal structure and comprises Co or a Co alloy with at least one element selected from the group consisting of Cr, Pt, Ta, B, Ti, Zr, Hf, Mo, Ru, Si, Ge, Nb, Fe, Ni, Ag, Au and combinations thereof.

4. The medium of claim 3, further comprising a non-oxidized or oxidized NiP or CoW layer on the substrate.

5. The medium of claim 1, wherein the magnetic layer comprises CoCr or an alloy of CoCr with at least one element selected from the group consisting of Pt, Ta, B, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au and combinations thereof.

6. The medium of claim 1, wherein the magnetic layer comprises (a) a Cr-rich layer of CoCr or CoCr with one or more elements selected from the group consisting of Pt, Ta, B, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au, where in Cr concentration is larger and equal to 17 atomic %, and (b) a Cr-dilute layer of CoCr or CoCr with one or more elements selected from the group consisting of Pt, Ta, B, Mo, Ru, Si, Cu, Ag, Ge, Nb, Fe, Ni, Au, where in Cr concentration is smaller than 17 atomic %.

7. The medium of claim 1, wherein the first intermediary layer has a thickness of less than 1 nm and the second intermediary layer has a thickness of about 0.01 to 3 nm.

8. A magnetic recording medium comprising a substrate, an interlayer and a magnetic layer, the interlayer comprising at least a first intermediary layer, a second intermediary layer and a third intermediary layer, wherein the first intermediary layer and the third intermediary layer are magnetic layers, the second intermediary layer has a hexagonal close pack crystal structure and provides RKKY coupling between the first intermediary layer and the third intermediary layer, and the magnetic layer comprises a Cr-rich layer and a Cr-dilute layer.

9. The medium of claim 8, wherein the first intermediary layer has a hexagonal close pack crystal structure and comprises Co or a Co alloy with at least one element selected from the group consisting of Cr, Pt, Ta, B, Ti, Zr, Hf, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au and combinations thereof.

10. The medium of claim 9, wherein the third intermediary layer has a hexagonal close pack crystal structure and comprises Co or a Co alloy with at least one element selected from the group consisting of Cr, Pt, Ta, B, Ti, Zr, Hf, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au and combinations thereof.

11. The medium of claim 8, wherein the magnetic layer comprises CoCr or an alloy of CoCr with at least one element selected from the group consisting of Pt, Ta, B, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au and combinations thereof.

12. The medium of claim 1, wherein the magnetic layer comprises (a) a Cr-rich layer of CoCr or CoCr with one or more elements selected from the group consisting of Pt, Ta, B, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au, where in Cr concentration is larger and equal to 17 atomic %, and (b) a Cr-dilute layer of CoCr or CoCr with one or more elements selected from the group consisting of Pt, Ta, B, Mo, Ru, Si, Cu, Ag, Ge, Nb, Fe, Ni, Au, where in Cr concentration is smaller than 17 atomic %.

13. The medium of claim 8, wherein the first intermediary layer has a thickness of less than 1 nm and the second intermediary layer has a thickness of about 0.01 to 3 nm.

14. A method of manufacturing a magnetic recording medium comprising depositing an interlayer on a substrate and depositing a magnetic layer on the interlayer, the interlayer comprising at least a first intermediary layer, a second intermediary layer and a third intermediary layer, wherein the first intermediary layer or the third intermediary layer is non-magnetic and the second intermediary layer has a hexagonal close pack crystal structure and a property of providing RKKY coupling between the first intermediary layer and the third intermediary layer when the first intermediary layer and the third intermediary layer are magnetic layers

15. The method of claim 14, wherein the first intermediary layer has a hexagonal close pack crystal structure and comprises Co or a Co alloy with at least one element selected from the group consisting of Cr, Pt, Ta, B, Ti, Zr, Hf, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au, and combinations thereof, and further wherein the third intermediary layer has a hexagonal close pack crystal structure and comprises Co or a Co alloy with at least one element selected from the group consisting of Cr, Pt, Ta, B, Ti, Zr, Hf, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au, and combinations thereof.

16. The method of claim 14, wherein the magnetic layer comprises (a) a Cr-rich layer of CoCr or CoCr with one or more elements selected from the group consisting

of Pt, Ta, B, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au, where in Cr concentration is larger and equal to 17 atomic %, and (b) a Cr-dilute layer of CoCr or CoCr with one or more elements selected from the group consisting of Pt, Ta, B, Mo, Ru, Si, Cu, Ag, Ge, Nb, Fe, Ni, Au, where in Cr concentration is smaller than 17 atomic %.

17. The method of claim 14, wherein the first intermediary layer has a thickness of less than 1 nm and the second intermediary layer has a thickness of about 0.01 to 3 nm.

18. A method of manufacturing a magnetic recording medium comprising depositing an interlayer on a substrate and depositing a magnetic layer on the interlayer, the interlayer comprising at least a first intermediary layer, a second intermediary layer and a third intermediary layer, wherein the first intermediary layer and the third intermediary layer are magnetic layers, the second intermediary layer has a hexagonal close pack crystal structure and provides RKKY coupling between the first intermediary layer and the third intermediary layer and the magnetic layer comprises a Cr-rich layer and a Cr-dilute layer.

19. The method of claim 18, wherein the first intermediary layer has a hexagonal close pack crystal structure and comprises Co or a Co alloy with at least one element selected from the group consisting of Cr, Pt, Ta, B, Ti, Zr, Hf, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au, and combinations thereof, and further wherein the third intermediary layer has a hexagonal close pack crystal structure and comprises Co or a Co

alloy with at least one element selected from the group consisting of Cr, Pt, Ta, B, Ti, Zr, Hf, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au, and combinations thereof.

20. The medium of claim 1, wherein the magnetic layer comprises (a) a Cr-rich layer of CoCr or CoCr with one or more elements selected from the group consisting of Pt, Ta, B, Mo, Ru, Si, Ge, Nb, Fe, Ni, Cu, Ag, Au, where in Cr concentration is larger and equal to 17 atomic %, and (b) a Cr-dilute layer of CoCr or CoCr with one or more elements selected from the group consisting of Pt, Ta, B, Mo, Ru, Si, Cu, Ag, Ge, Nb, Fe, Ni, Au, where in Cr concentration is smaller than 17 atomic %.

21. The medium of claim 1, wherein the second intermediary layer has a hexagonal close pack crystal structure and comprises a material selected from the group consisting of Ru, Re and alloys thereof.

22. The medium of claim 21, wherein the second intermediary layer further comprises at least one *bcc*-structured element selected from the group consisting of W, Mo, Ta, Nb, Cr, and V.

23. The medium of claim 8, wherein the second intermediary layer has a hexagonal close pack crystal structure and comprises a material selected from the group consisting of Ru, Re and alloys thereof.

24. The medium of claim 23, wherein the second intermediary layer further comprises at least one *bcc*-structured element selected from the group consisting of W, Mo, Ta, Nb, Cr, and V.

25. The medium of claim 1, wherein the second intermediary layer has a hexagonal close pack crystal structure and comprises Ru or a Ru alloy that consist of over 80 at. % of Ru and the rest of elements selected from the group consisting of Ti, V, Cr, Zr, Nb, Mo, Rh, Hf, Ta, W and Ir.

26. The medium of claim 23, wherein the second intermediary layer has a hexagonal close pack crystal structure and comprises Ru or a Ru alloy that consist of over 80 at. % of Ru and the rest of elements selected from the group consisting of Ti, V, Cr, Zr, Nb, Mo, Rh, Hf, Ta, W and Ir.